

ABSTRACT

This invention relates to an electrophoretic display or a liquid crystal display and novel processes for its manufacture. The electrophoretic display (EPD) of the present invention comprises microcups of well-defined shape, size and aspect ratio and the microcups are filled with charged pigment particles dispersed in an optically contrasting dielectric solvent. The liquid crystal display (LCD) of this invention comprises well-defined microcups filled with at least a liquid crystal composition having its ordinary refractive index matched to that of the isotropic cup material. A novel roll-to-roll process and apparatus of the invention permit the display manufacture to be carried out continuously by a synchronized photo-lithographic process. The synchronized roll-to-roll process and apparatus permits a pre-patterned photomask, formed as a continuous loop, to be rolled in a synchronized motion in close parallel alignment to a web which has been pre-coated with a radiation sensitive material, so as to maintain image alignment during exposure to a radiation source. The radiation sensitive material may be a radiation curable material, in which the exposed and cured portions form the microcup structure. In an additional process step, the radiation sensitive material may be a positively working photoresist which temporarily sealing the microcups. Exposure of a selected subset of the microcups via the photomask image permits selective re-opening, filling and sealing of the microcup subset. Repetition with additional colors permits the continuous assembly of a multicolor EPD or LCD display.